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# Washington County Project: Institutional and Legal Complexities of Nonpoint Source Pollution Control

Wisconsin Board of Soil and Water Conservation Districts, Madison

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# Washington County Project

## Institutional and Legal Complexities of Nonpoint Source Pollution Control

## Summary Report

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The U.S. Environmental Protection Agency was created because of increasing public and governmental concern about the dangers of pollution to the health and welfare of the American people. Noxious air, foul water, and spoiled land are tragic testimony to the deterioration of our natural environment.

The Great Lakes National Program Office (GLNPO) of the U.S. EPA was established in Region V, Chicago, to provide specific focus on the water quality concerns of the Great Lakes. The Section 108(a) Demonstration Grant Program of P.L. 92-500 (1972 Amendments to the Federal Water Pollution Control Act) is specific to the Great Lakes drainage basin and thus is administered by the Great Lakes National Program Office.

Several sediment erosion-control projects within the Great Lakes drainage basin have been funded as a result of Section 108(a). This report describes one such project supported by this office as a part of our responsibility to improve water quality in the Great Lakes.

We hope the information and data contained herein will help planners and managers of pollution control agencies to make better decisions in carrying forward their pollution control responsibilities.

Madonna F. McGrath
Director
Great Lakes National Program Office

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The major objective of the Washington County Project was to test the potential for nonpoint source regulatory program on a county-wide basis. Once problems were defined and solutions were developed, the ultimate challenges facing the project was to work with local decision makers to implement those proposals and to observe and document the successes and failures of those efforts.

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# INSTITUTIONAL AND LEGAL COMPLEXITIES OF NONPOINT SOURCE POLLUTION CONTROL

## Washington County Project: Summary Report

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Village Board of Germantown
Washington County Board

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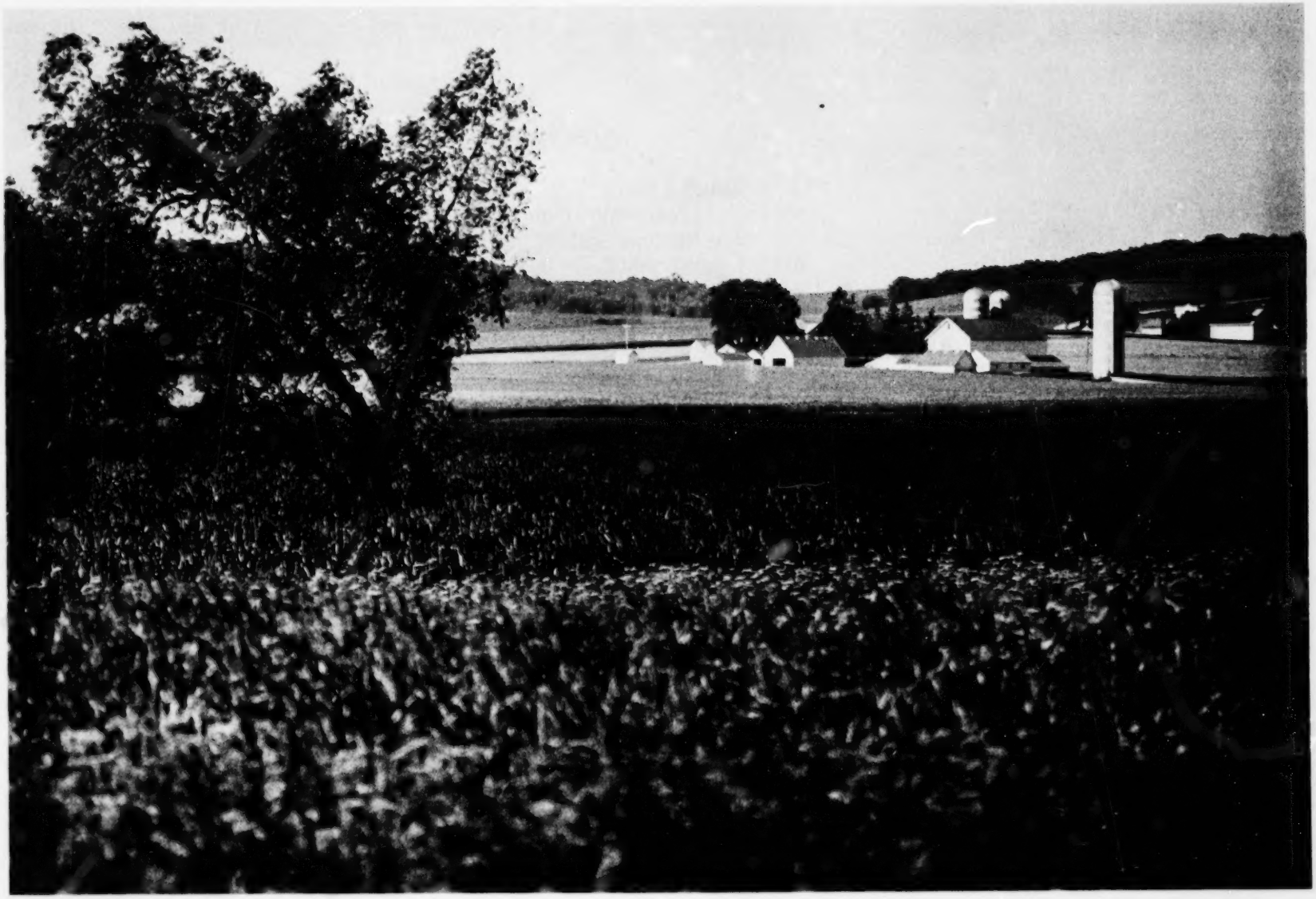


## Introduction

In the late 1960s the U.S. Congress took a hard look at the nation's water quality problems. The results of this assessment were discouraging. Despite a substantial financial investment in a sewage treatment plant construction program, improvements in water quality were not apparent; the nation's waters were, if anything, becoming more polluted.

In response to this, Congress amended the Federal Water Pollution Control Act in 1972. The passage of this act—P.L. 92-500—marked the beginning of a sweeping new strategy designed to clean up the nation's lakes and streams. Pollutants would no longer be treated in receiving waters; they would be treated at their sources. Under this strategy, effluent discharges from industries and municipalities as well as nutrient, sediment, pesticide and heavy metal losses from farm fields, city streets, parking lots and lawns were to be controlled. The terms "point source" and "nonpoint" were coined to describe these situations.

P.L. 92-500 was a major, and in many respects, a controversial piece of legislation. An accelerated program of sewage treatment plant construction was authorized and a permit system for pollutant discharges was established. Extensive planning requirements were imposed on state, regional and local agencies. The mandate was clear: treat pollution at its source.

Point source problems were relatively easy to identify and their solutions were limited primarily by a lack of adequate treatment technology and a lack of funds. The nonpoint source problem, however, was much more complex. Nonpoint sources are difficult to define and quantify and management strategies are not clear. The institutional and legal issues relating to the authority of agencies to develop and implement nonpoint pollution control programs were unresolved.

In early 1973, a Wisconsin Governor's Conference on Sediment and Erosion identified sediment as a major pollutant and urged the development of programs to provide sediment control. At about the same time, a major project to identify the sources and assess the impacts of urban nonpoint source pollution was initiated on the Menomonee River in the Milwaukee metropolitan area by the Wisconsin Department of Natural Resources (DNR) and the University of Wisconsin-Water Resources Center (WRC) under the auspices of the International Joint Commission (IJC). The IJC project was part of a series of projects initiated by Canada and the United States as a result of the international water quality agreements of 1972.

A comprehensive study in a specific geographic setting was needed to examine the complexities of the sediment control problem from its technical side and from its legal, social and institutional aspects. A water quality monitoring program was essential to quantify the sediment and erosion problems arising from selected land uses. The existing legal, economic, institutional and political framework for sediment control had to be scrutinized. Local decision makers had to develop and implement legal and institutional approaches to sediment control problems.

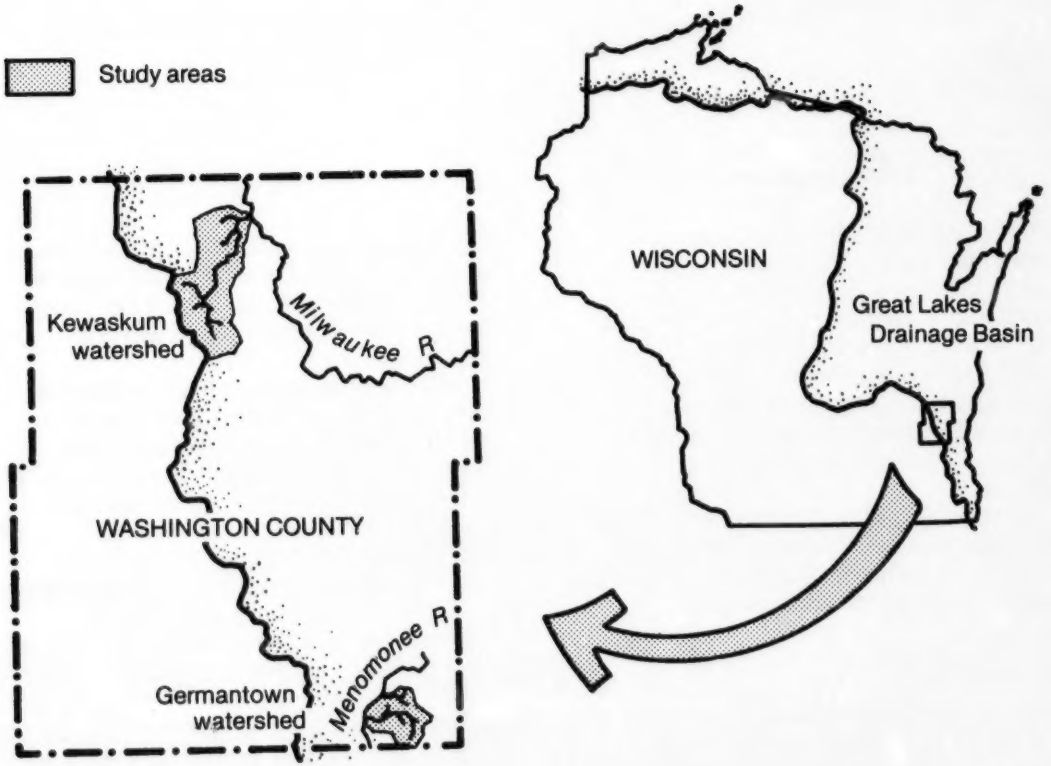
Public involvement in the entire process was critical to provide a thorough understanding of the sediment problem and its solutions and ensure a general acceptance of measures proposed to meet sediment control objectives. The successes and failures had to be carefully documented so that the experiences gained could be effectively transferred to other areas.

## The Washington County Project

Washington County in southeastern Wisconsin appeared to offer an ideal location for the study described. Although a predominantly rural area, the county was under tremendous urban pressures from adjacent Milwaukee County and the Milwaukee metropolitan area. Elected officials, political leaders and private citizens were eager to seek solutions to the pressing land use and water quality problems associated with growth and changing use patterns.

In this setting, then, the Washington County Project was conceived. Staff of the University of Wisconsin pulled together a coalition of five federal agencies, four state agencies, and four local and regional agencies "to demonstrate the effectiveness of land control measures in improving water quality, and to devise the necessary institutional arrangements for the preparation, acceptance, adoption and implementation of a sediment control ordinance applicable to incorporated and unincorporated areas on a county-wide basis."

The Washington County Project, designed as a sediment control project, did not attempt to evaluate and seek solutions for all types of nonpoint source pollution. In rural areas sediment control with its associated nutrients and pesticides may be synonymous with nonpoint source control. In urban areas, however, sediment control is only part of the problem. Sediment is, from a water quality standpoint, a relatively minor component when compared to toxins, heavy metals, etc.




The Washington County Project was organized with the involvement and cooperation of agencies from all levels of government. The goal was to document sediment problems in urban and rural areas, to define the effectiveness of control measures for solving those problems, and to weave together into an effective coalition the governmental institutions which have responsibility for and jurisdiction over land use/water quality problems. Once problems were defined and solutions were developed, the ultimate challenges facing the project were to work with local decision makers to implement these proposals and to observe and document the successes and failures of these efforts.

## The Political Setting

The decision to control pollution at its source was controversial. In rural areas, the specter of government regulation of farm land and the resulting loss of individual rights was raised. In many places—including Washington County—the mood was one of resignation. Regulation was not a popular notion, but most people agreed that if it were to come, then at least it ought to be at the local level.

P.L. 92-500 was not, in the minds of some people, clear on the question of regulation. Section 208 called for the development of plans for the control of nonpoint sources of pollution and for the development of regulatory programs "wherever feasible." It was not clear, however, if regulatory programs were required before the U.S. Environmental Protection Agency (EPA) would approve "208" plans. A major objective of the Washington County Project was to test the potential for a regulatory program.

From the time of the passage of P.L. 92-500, the nonpoint source program was the poor country cousin of the point source programs. Billions were authorized for the construction of sewage treatment plants while only planning dollars were provided for nonpoint programs. A series of court tests in the early 1970s established that "208" planning had to include entire states and cover both point and nonpoint sources. A provision of P.L. 92-500 stated that no money could be provided for a treatment facility unless that facility was part of a "208" plan which presumably established strategies and priorities for the control of pollution from all sources. This authority has yet to be exercised.

In 1973 the State of Wisconsin attempted to develop rules regarding the handling of animal wastes. Howls of protest were heard. Hearing rooms were filled with irate farmers who feared prohibition of winter spreading of manure—a necessary evil in a dairy state like Wisconsin. The state legislature responded by passing a law which stated that no regulation of animal wastes could be adopted without the legislature's approval. This constraint remained in effect until 1980 and prevented the

development of the mandated state permit system for large animal concentrations.

Fears by farmers of regulation and overreaction by legislators forced nonpoint planning programs to assume a low profile. Additionally, not much was known technically about the nonpoint problem. Planners found it difficult to plan for something about which they basically knew nothing.

The EPA was well organized to handle the expanded construction grant program authorized by P.L. 92-500. Basically, it was a program they had handled for years. An office of nonpoint programs was established however, but it was small and understaffed. Communications between EPA and the U.S. Department of Agriculture (USDA), which would ultimately play an important role in nonpoint control, were virtually not existent.

## Institutional Complexities Involved

Responsibility for the administration and implementation of water resource programs and policies at the national level has followed a much different path than that for land management programs. Historically, the federal government has asserted its control over water policy and has implemented a variety of programs involving dams and flood control, canals, irrigation and hydropower. Federal involvement in water pollution abatement dates back to about 1900, although the role the government actually played was limited until the 1960s and 1970s. Basically, states have been responsible for regulating those water problems not covered under federal programs and, more recently, have been charged with implementing federal policies for pollution abatement. Local involvement in water programs has been minimal.

Land management programs and policies have developed much differently than water resource programs and policies. These programs and policies have emphasized the individual rights of the landowner. The authority to regulate the individual's use of the land has been reserved for the states through their police power. Over the years, much of that responsibility has been delegated to local government. Federal involvement in land management programs has always been minimal and primarily supportive; witness, for example, the technical assistance and cost sharing programs of the USDA.

Nonpoint source pollution control posed an interesting challenge because it would require treating land use abuses to restore and protect surface water quality. Technically the land use problems appeared to be solvable, but when considering the historical dichotomy between land and water policies and programs the challenges seemed insurmountable.

There were two options for the Washington County Project: propose a series of new agencies at all levels of government to deal with nonpoint problems; or develop linkages between and among existing agencies to meet new programs and policies. The project followed the latter course and emphasized the analysis of the functions and operation of existing units of government, of statutory weaknesses and imperfections, of current program implementation, and of manpower and financial needs.

## Technical Dimensions of the Problem

Initially, not much was understood about the nonpoint source pollution problem. Estimates were made of the magnitude but its total dimensions were unclear. Some land uses—residential construction and large animal feedlots—had been examined in some detail and their sediment and nutrient yields were fairly well quantified. In urban areas, however, little was known about runoff from established residential areas, highway interchanges or manufacturing and industrial sites.

In agricultural areas the situation was equally complex. Extensive work by the USDA and the universities had validated the Universal Soil Loss Equation (USLE), which provided information on soil loss in individual fields under specific management, crop, slope, climatic and soil conditions. Conservation practices to reduce soil erosion and conserve water

had been applied to the land for more than 30 years in this country, but the effectiveness of these practices from a water quality standpoint had never been tested. The USLE did not provide a reliable determination of how much of the soil lost from the land actually reached the lakes and streams. Intuitively, it appeared that many of the well established land management practices would conserve soil and protect water quality. This idea, however, needed to be examined.

## Water Quality Monitoring

Field monitoring programs were established in the rapidly urbanizing southeastern corner of Washington County around Germantown and in a rural part of the county near Kewaskum where well-operated, average-sized dairy farms were located in two moderately sized watersheds.

Legend Acres and Old Farm subdivisions were each a part of the same cornfield when the project started. Monitoring equipment was installed at key locations in these developments during the early stages of land forming and street construction. In the initial plans, about half of the land area in each subdivision was to be treated and construction was to proceed normally on the remainder of the land. Treatment involved stabilizing stockpiled soil and mulching and re-vegetating undeveloped lots. These practices would reduce erosion while roads were laid out, lots were graded and individual homes were constructed. Data from the monitoring stations would then be compared to assess the effectiveness of the treatment measures.

The first year of the project was an extremely dry period climatically and a time of fairly rapid economic growth. As a result of these two factors, home construction in the subdivisions was nearly complete in about 1½ years—some 3 to 4 years ahead of projections. Thus, treated and untreated areas could not be compared, but data from the period of initial construction showed annual sediment losses ranging from 16,000 to 36,000 kg/ha. During the second year, sediment yields at two of the sites dropped to 2,800 to 4,600 kg/ha. These figures are interesting in that during this period most of the building was completed, lawns were established and lots were stabilized. These results indicated the need for a second level of control designed to minimize erosion during the construction of individual homes.

In the agricultural watersheds

monitoring stations were established at outlet points to determine total nutrient and sediment outputs and at selected sites within them to isolate specific land uses. In one of the watersheds, treatment involved the installation and implementation of conservation practices such as contour stripping and grassed waterways. This resulted in a 50 to 60% reduction in total nitrogen and phosphorous and nearly a sevenfold reduction in sediment at the bottom of the watershed.

At one site—a dairy barnyard/feedlot area—results were even more dramatic. Reductions of 94% for total phosphorous and 83% for total nitrogen followed the construction of an improved barnyard area. Annual sediment yield dropped from 5,500 to 200 kg/ha at this site.

## Institutional Strategies

The Washington County Project's monitoring program was established to quantify the nonpoint pollution problem in selected settings, to assess the effectiveness of control measures in reducing the problem and, perhaps most importantly, to provide the technical back-up for programs designed to control this diffuse type of pollution. On the premise that local units of government were best suited to meet the challenge of controlling nonpoint source pollution, project attention was focused on identifying the appropriate local governmental unit and defining its role in the process and on establishing linkages between it and other land and water agencies at all government levels.

A detailed analysis of the county board in Washington County indicated that it might be well suited for the task. The public did not appear to understand the functions of the board and elected supervisors had very little contact with their constituents. To political analysts, this appeared to be an ideal governmental unit to deal with the controversial issue of the regulation of agricultural land.

Powers of county boards in Wisconsin are limited because they are an arm of state government and have only those powers which the state grants them. Additionally, they are restricted in their authority to the unincorporated areas of the county. Chapter 92 of the Wisconsin Statutes, however, created Soil and Water Conservation Districts (SWCDs or the districts) as a special purpose unit of

government to be coterminous with counties. Furthermore, SWCD supervisors are designated by statute to be those county supervisors who serve on the county board's Agriculture and Extension Education Committee. This linkage, plus some additional authority provided by the statutes, made the SWCD the ideal focal point for the development of programs for controlling nonpoint source pollution.

Although questions were raised as to whether or not Chapter 92 provided adequate authority to deal with the broad spectrum of land use-water quality problems, it was clear that SWCDs should initiate the development of remedial programs. The SWCDs in Wisconsin, however, were underfinanced and understaffed and the supervisors were often unaccustomed to and uninterested in taking on the assertive role that this new leadership would require. An exhaustive review of the statutory authorities available to the districts and counties concluded that the legal tools to do the job existed, although certain improvements and clarifications in the statutes would be required in the long run.

## Agency Linkages

The key to the success of any nonpoint control program at the local level would be the involvement of the USDA's Soil Conservation Service (SCS) and the Agriculture Stabilization and Conservation Service (ASCS). The SCS is a technical assistance agency with a mandate to provide, at the direction of the SWCD, management and design assistance to landowners in reducing soil erosion. The ASCS, through its Agricultural Conservation Program (ACP), provides cost sharing to farmers and landowners for the installation of conservation practices.

Over the years, these two programs—in many areas, including Washington County—have not been closely coordinated. Decisions on ACP investments are made by a separate committee elected by rural residents. Project research showed that in Washington County the SCS spent over 50% of its time providing technical assistance for ACP projects, yet the SWCD had little, if anything, to say about the approval of those projects. ACP projects were randomly spread across the county with little apparent relationship to areas of erosion or water quality problems.

Likewise, SCS assistance in Washington County and elsewhere was provided to farmers who chose to participate in the program; little or no effort was made to involve farmers in selected critical erosion areas in the program. Conservation planning was a slow and cumbersome process which resulted in extensive plans seldom used by farmers. Close coordination and some redirection of these programs will be essential to the successful implementation of rural nonpoint pollution control programs.

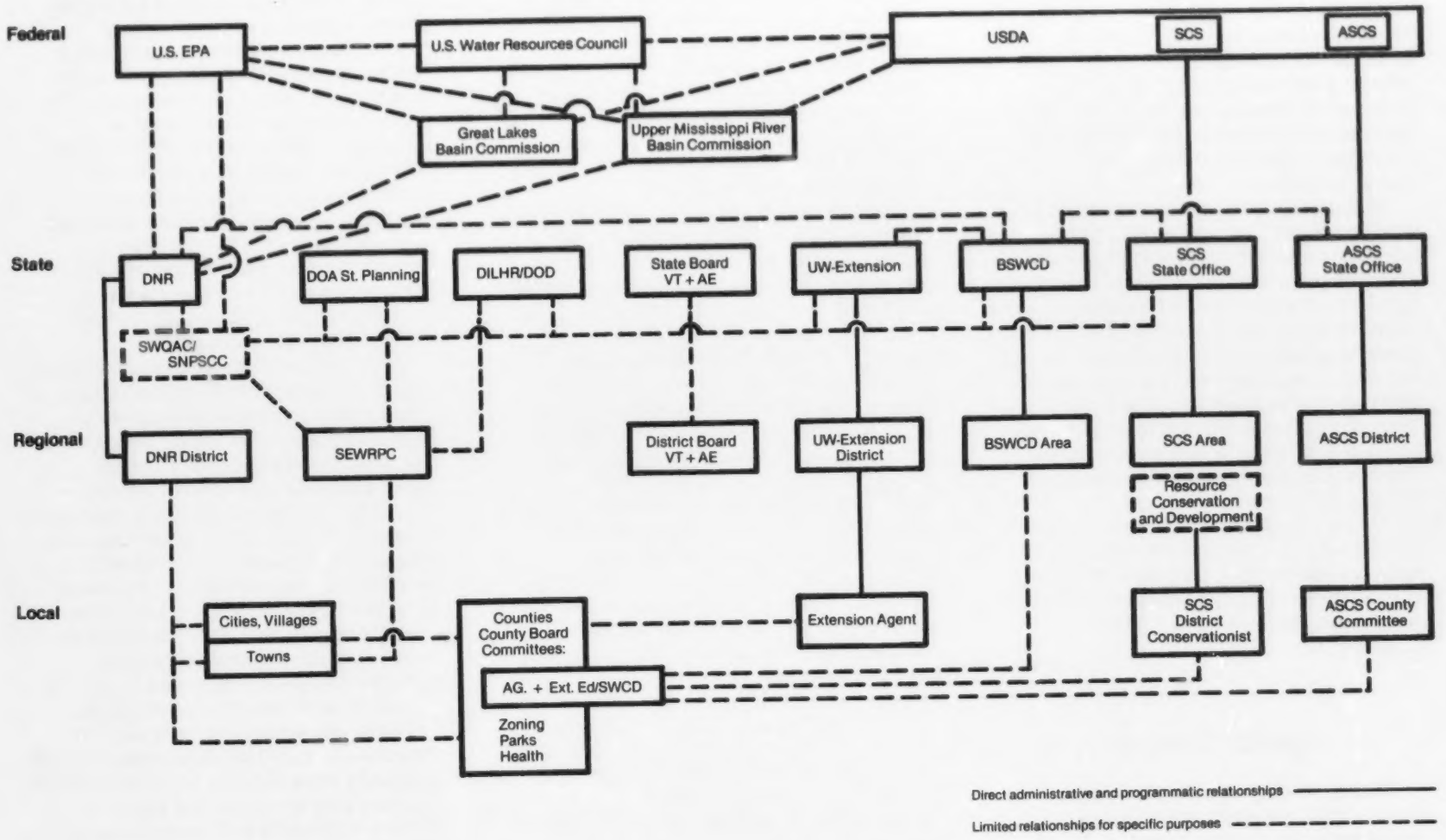
## Ordinance Development

One of the goals of the Washington County Project was to develop a mechanism for sediment control on a county-wide basis applicable to incorporated and unincorporated areas. The sediment problems were readily identified—the control of construction site erosion, primarily a concern in urban areas, and the reduction of sediment and nutrient losses from agricultural activities. The statutory separation that exists in the Wisconsin statutes between incorporated and unincorporated areas would hamper efforts to achieve uniformity.

Chapter 236 of the Wisconsin statutes requires a potential subdivider to submit plans for development to a variety of local and state agencies for review and approval. Most states have similar requirements in one form or another. Normally, plan review includes only such things as grades, storm sewer capacity, septic tank suitability if appropriate, and the like. Any provision in the plans to control sedimentation and erosion during construction when topsoil and vegetation are removed, exposing subsoils to the erosive forces of rainfall and wind, was commonly overlooked.

The solution seemed fairly straightforward—require that developers include adequate provisions for erosion control at the time they are preparing plans for streets, sidewalks and sewers, etc. In Wisconsin, permits for subdivision construction in unincorporated areas are

## Wisconsin's Organizational Structure for Water Quality Management



usually issued by the county zoning administrator. Thus, the proposal was made to require the developers to add erosion control plans to the plans submitted to the county zoning office.

The technical expertise of county government to assess the effectiveness of the proposed erosion control measures was immediately questioned. The answer was obvious—the SWCD with its staff and ties to the SCS was well suited for the task.

With all this in mind, the Washington County Project staff developed a model sediment control ordinance which required the submission, review and approval of erosion control plans as a part of the plat review process. In the drafting of the ordinance, great care was taken to make the review process as painless as possible for the developer and to insure that the review of the erosion control provisions did not increase the time involved in the overall review of the plat. The role that the SWCD could play in this process was unclear in the Wisconsin statutes. Rather than risk any legal challenge, the ordinance proposed that the SWCD make recommendations on the adequacy of the plans to the zoning administrator who clearly had approval authority.

Once drafted, the model ordinance was widely circulated among county and town officials and town legal representatives. Many meetings were held and a variety of constructive suggestions were made. Whenever appropriate, these suggestions were incorporated in the model ordinance. Public hearings held before the county zoning committee were attended by two people, both of whom testified in favor of the proposed legislation. County Board action in favor of the ordinance was unanimous.

In Wisconsin, civil towns have the authority to adopt village powers. Although the full implications of this are not clear, village powers do provide towns with planning and zoning powers if they so choose. Those towns in Washington County which have taken on these responsibilities immediately added the county-adopted provisions for erosion control to their existing subdivision controls.

Adoption of the model ordinance in incorporated areas—cities and villages—posed another set of problems. Most cities, for example, have their own engineers and thus may have the capability to review plans for sediment and erosion control themselves. The project strategy was to propose to the cities and villages that they adopt the key provisions of county ordinance, namely, that plans for erosion control during subdivision construction be developed. It was also suggested that these governmental units review the plans themselves or submit them to the SWCD for advisory review. The Village of Germantown, which previously had become a co-operator with the SWCD for assistance with erosion control problems, chose to utilize its engineer for review. The City of West Bend, however, entered into a memorandum of understanding with the SWCD which established the SWCD as the review agency. Ultimately, all the incorporated areas in Washington County adopted the project-developed ordinance in one form or another.

As indicated previously, water quality monitoring data from the subdivisions in Germantown suggested that appreciable amounts of sediment were being generated from the construction of individual homes. Mechanisms to control this probem appeared elusive. The problem stems from the fact that homes in subdivisions are often built by individual contractors rather than by the original subdivider. For these home contractors, time is literally money and houses need to be finished as quickly as possible. Much of the specialized work—plumbing, dry walling and wiring—is subcontracted out. None of the people involved have much of a stake in seeing to it that erosion is controlled on the lot during construction.

The Village of Germantown, aware of project data and plagued with sediment-clogged streets and storm sewers, added provisions covering sediment control to their requirements for individual home construction permits.

The project worked closely with the Village of Germantown, local contractors and individual homeowners to provide solutions to this problem. Demonstrations were established to show how simple practices, many of which involve little or no financial outlay, can be installed onsite to alleviate many of these erosion problems. Brochures

describing the techniques were written for contractors. A mechanism for providing state cost sharing assistance for urban erosion control was tested successfully.

As a result of the project, a uniform mechanism for sediment and erosion control during subdivision construction has been established in Washington County. Acceptance of and compliance with the new requirements has been excellent. Problems in determining compliance were anticipated as zoning officials in the county did not feel that they were sufficiently trained in erosion control technology to determine whether or not plans were being followed. Technicians from the SCS and SWCD agreed to do onsite inspections where necessary.

Guidelines indicating what was expected of developers under the new ordinance were prepared. Concerns for increased costs due to the installation of the required measures failed to materialize. Most importantly, the new requirements were developed within existing statutory frameworks. New legislative mandates were not required.

## The Rural Ordinance

Developing an ordinance to control sediment from agricultural lands in rural areas posed a much more complex set of problems. What standards would be established? How and by whom would those standards be administered and enforced? What agencies would be involved and what would their roles be? Under what statutory authority would the program be developed?

The question of standards was particularly difficult since there were several options. Stream standards, under which levels for nutrients and sediment would be established for various stream segments, was one possibility. The problem with this approach was that even though water quality monitoring might indicate elevated levels of one pollutant or another, it would be impossible to say from where in the watershed a particular pollutant was coming. The only way to attempt to reduce the excessive pollutant loading would be to treat the whole watershed, a cumbersome and expensive strategy.

Another way to solve these problems would be to mandate "wall-to-wall" conservation, which is to say simply that a conservation plan would be required for each farm. This is a desirable goal, but probably unrealistic. In Washington County, during the mid-1970s and after more than 30 years of government programs, more than 100,000 acres of farmland (about 65% of the county total) was not covered by a conservation plan. Planning was proceeding in the county at a rate of about 3000 acres per year and at existing manpower levels at least 30 more years would be required to complete planning for the county. The existence of a conservation plan for each farm, however, does not guarantee that the plan is followed. Some type of inspection and enforcement program would be needed to insure compliance, but the manpower was simply not available for this type of effort.

Another strategy, and that which the Washington County Project chose to pursue, was the development of performance standards for individual farm units. The concept is relatively simple: each farmer must meet a performance standard; his/her farm must not exceed a certain rate of sediment loss as determined by the USLE. There are distinct advantages to this approach: it does not dictate directly how farmers must farm, it is based on the "tolerable soil loss" (T value), which is an accepted, uniform standard for soil conservation, and it is administratively feasible.

Project staff, utilizing the authorities of Chapter 92 of the Wisconsin Statutes, drafted a rural sediment control ordinance for Washington County. The ordinance prohibited long-term average soil losses >3 tons/acre/year for each farming unit and prohibited losses >9 tons/acre/year for any 200 square foot area (approximately 1 acre). This latter caveat was designed to meet the situation where a farm unit meeting the overall soil loss standard might have small critical erosion areas that contribute excessive amounts of sediment.

Chapter 92 provides SWCDs with the authority to develop and implement an ordinance of this type if a majority of the voters residing in the area to be affected approve it in a referendum. The project's draft ordinance was reviewed extensively with the county SWCD supervisors and the decision was made to take it to referendum in selected areas of Washington County. Unfortunately governmental support for regulatory

programs at the state and federal levels collapsed at about this time. Without pressure from external sources Washington County could not be expected to quickly implement an ordinance to restrict sediment loss from agricultural operations.

Although the ordinance was not enacted in Washington County, a resolution endorsing the objectives and standards of the regulatory proposal was adopted by the SWCD and passed by the county board. Although it was obviously not the same as an ordinance, this resolution indicated an awareness of the problem and its solutions by local decision makers and endorsed the standards which an ordinance would have established. Most importantly, perhaps, it provides a framework for the SWCD to operate within as it attempts to prioritize its programs and invest its funds in projects which will effectively reduce water quality problems.

## Projected Impacts of the Rural Ordinance

One of the obvious concerns which arose in the review of the rural ordinance was its potential economic impact on farmers. A detailed analysis of several dairy farms in the Kewaskum watershed revealed that not only could existing farms meet the standard with ease and with little or no adverse economic impact, but also that appreciably lower soil loss limits could be met with approximately the same minor impacts. The secret lies in the inherent flexibility of dairy farming. Feed needs for dairy cattle require the production of both legumes and corn. This allows for significant manipulation of croplands. Legumes, which resist soil erosion, can be grown on vulnerable sloping soils, while flatter soils can be used for row crops, particularly corn. Reduced tillage can further retard soil losses from row-cropped fields. A farmer with an excess of sloping land, in order to meet soil loss standards and avoid adverse economic impacts, might produce more hay, this in turn, would necessitate the expansion of his/her dairy herd.

This economic analysis was not expanded to include cash cropping agricultural enterprises which are by their nature often restricted to the production of a single crop. Cash crop operations are currently not widespread in Washington County. In other parts of Wisconsin and in other states, however, monoculture is a grave problem requiring careful attention and which may result in significantly different economic impacts on farmers and/or significantly higher investments of public money.

Another potential economic impact for farmers affected by the proposed

ordinance would be the cost of erosion control structures. This concern was alleviated by adding a provision to the proposed Washington County ordinance which stated that no structural measures would be required if public cost sharing assistance of at least 50% of the cost of the measure was not available.

There were other questions, too. How many farmers would be affected? What kind of manpower would be required to administer and enforce the ordinance? It was estimated that in Washington County soil losses exceeded 3 tons/acre/year on about 20% of the cropland. Under the proposed ordinance, it was anticipated that 100 to 150 farms—of the nearly 1400 farms in the county—would be affected. A 50% reduction in soil loss on these farms would reduce total cropland soil losses in Washington County by 35%. Most importantly, the existing technical staff, with a reordering of priorities, could handle the workload generated by the ordinance.

## Conservation Tillage

An integral part of the strategy to reduce agricultural soil loss was the adoption of reduced tillage techniques by farmers. Reduced, or conservation tillage involves—in the very simplest sense—less working of the soil. Plant residues left on roughened soil surfaces reduce the impact—and hence erosive energy—of falling raindrops and allow greater infiltration of water into the soil. In the extreme case of no-till farming, seeds are placed in a narrow seedbed without disturbing most of the land.

Demonstration plots were established in the Kewaskum watershed to compare no-till techniques with reduced and conventional tillage. Yields from the latter two were comparable, while yields under no-till were somewhat lower. Sediment and total phosphorus losses under no-till cropping were the lowest of the systems tested, although amounts of available phosphorus—that which stimulates aquatic plant growth—were the highest. Reduced tillage offered a reasonable alternative because sediment and phosphorus losses were reduced significantly with little if any yield reduction.

Reduced tillage techniques were not new, but the number of acres in Wisconsin being farmed in this fashion were limited. If the benefits were as great as the demonstrations suggested, why had the concept not been more accepted by farmers? To examine this question, a detailed survey was taken of 50 farmers in Dane County, Wisconsin, who had participated in an SWCD-sponsored reduced tillage project. All respondents were generally pleased with conservation tillage and felt that it saved soil, time and money, although 40% of them felt that the financial savings were negligible. An analysis of how these farmers practiced conservation tillage revealed that on the average they only cultivated their fields one less time than they did with conventional tillage. This would account for the notion that financial savings from conservation tillage are minimal. One less trip across the field is not conserving enough!

Yield results reported by the farmers surveyed were comparable to those reported in the demonstration effort in Washington County. Most reported equal yields from reduced and conventional tillage, while 18% of those interviewed had higher yields with conservation tillage. Forty percent, however, experienced a significant yield reduction with no-till.

Farmers also reported other drawbacks to no-till cultivation, including planting and germination problems and an increase in weeds and insects. They appeared concerned about the additional chemicals required for no-till and expressed frustration over their inability to solve problems in no-till fields during the growing season.

## Shoreland Areas

Wisconsin has a strong dairy industry, yet one of the greatest rural nonpoint source pollution problems arises from the practice of pasturing cattle in areas adjacent to streams. Streambanks and adjacent lands often are not well suited to conventional farming, but farmers are taxed for their ownership. They in turn feel that they must get a return for the taxes they pay. Shoreland areas do provide limited amounts of feed and are a source of water. Water quality problems arising from their use involve the direct

deposition of waste in the stream and, more importantly, the physical breakdown of the streambank itself under the pressures of animal traffic. Unprotected, eroded streambanks are a direct and significant source of sediment.

Section 59.971 of the Wisconsin Statutes requires counties to adopt comprehensive shoreland zoning to include land areas 300 feet from navigable rivers and streams and 1000 feet from lakes. The project staff developed a series of amendments to the existing Washington County shoreland zoning ordinance. These amendments would have regulated highly erosive tillage practices in shoreland zones, prohibited cattle access to erodible streambanks, controlled pollution from barnyard/feedlot areas in the shoreland zone and restricted the application of animal wastes while the ground is frozen.

The advantages of using the shoreland zoning approach is that it focuses attention on those areas contributing nutrients and sediment directly to streams and lakes. There are, however, drawbacks. Zoning had not been widely used in the past to control farm practices in areas already zoned for agricultural uses. Also, when zoning ordinances are enacted, existing land use practices are "grandfathered," i.e., such practices are allowed to continue until they have been discontinued for a 12-month period. Another problem arises from the fact that if these amendments had been adopted in Washington County, they would have been administered by committees and agencies other than the SWCD.

Originally designed to complement the proposed Chapter 92 ordinance, the zoning amendments took on new importance as support for more comprehensive regulation evaporated. Although not yet adopted, the Washington County Park and Planning Commission has given the proposed amendments serious review and may, in the future, include all or part of them in revisions to their existing code.

## Urbanizing Areas

As urban areas grow, the lands around them are converted from cornfields and pastures to houses, roads and shopping centers. This process can be slow and carefully controlled or it can be rapid and random. As urban growth encroaches on rural areas, a belt transitional land develops. This land often remains in agricultural production, but is owned by an absentee landowner and cash cropped by an operator with little stake in conserving the soil resource.

A detailed analysis of the transitional land area around the City of Madison in

Dane County, Wisconsin and the Village of Germantown in Washington County, Wisconsin revealed some interesting facts. As this land is purchased, often for speculative purposes, agriculture changes from dairying to cash cropping and the advantages of dairy farming from a water quality perspective are lost. Crops are still produced, but the motivation is merely to provide some income to the landowner to offset the tax bill while the land awaits development.

Soil losses under these circumstances are extremely high for what could be an extended period of time. For example, several years ago the City of Madison exercised its extraterritorial zoning authority. The City prohibited development in the 3-mile wide strip immediately adjacent to its city limits and uncontrolled cash cropping will probably continue for the foreseeable future.

No solution to this problem is apparent. Management assistance to owners and operators was proposed, but it was observed that the conservation ethic had been lost and that short-term financial return was more of a concern than long-term productivity and protection of the soil resource. Although specific proposals were not developed, project staff agreed that this situation, perhaps more than any other in the rural setting, required regulation to control soil erosion.

## The Education and Information Effort

It was apparent from the outset of the project that the public's understanding and knowledge of sedimentation and nonpoint source pollution was limited. To acquaint people with the sedimentation process—how it worked, what contaminants moved with sediment in runoff waters and what the impacts of those materials were on water quality—an education and information effort was designed. The first audiences were primarily elected officials and local community leaders. In the early months of the project, the staff made presentations to every service, garden and environmental club in Washington County. The initial strategy was to take advantage of meetings called for other purposes. Convening meetings to discuss only nonpoint source pollution proved to be a hopeless task; the work involved in setting them up was enormous, while the number of people attending was miniscule.

As the project evolved and various regulatory proposals were drafted and supporting monitoring data were collected, many organizations were revisited and presented with updated information and materials. Linkages were established with other agencies doing nonpoint work, particularly the Southeast Wisconsin Regional Planning Commission (SEWRPC) which was developing the "208" plan for Washington and other counties in the Milwaukee Metropolitan area. The adult education strategy of the Washington County Project focused on local elected officials and other community leaders in the hope that they would pass on the information to the general public.

Audio-visual materials were developed to support the public information program and to broaden its audience. A slide tape set titled "Clean Clear Water for Washington County" provided the back up for the initial educational effort. Brochures describing the sediment problem in general, as well as specific aspects of the nonpoint problem, were written and distributed. A film—"Runoff, Land Use and Water Quality"—explored the broad aspects of the nonpoint source problem from a regional and national perspective. A print media specialist developed a series of newspaper stories on project efforts which were widely used in Washington County, particularly in weekly newspapers. A day-long background tour for journalists was jointly sponsored by the Washington County and the Menomonee River Projects.

Finally, a film called "Save Our Soil, Save Our Streams" was produced to explore the institutional alternatives available to local decision makers to solve nonpoint source pollution problems.

Conferences of various types afforded project staff the opportunity to discuss problems and achievements with workers tackling similar problems in other physical and geographic settings. Scientific meetings and journals provided vehicles for the discussion and review of technical accomplishments.

Early in the project, school teachers in Washington County were contacted to determine their interest in including local land use and water quality issues in school curricula. Teacher response was excellent and a program was designed to provide the teachers with sufficient background and training so they could develop new teaching units on topics such as land use, water quality and soil and water conservation.

These training programs took several forms. Initially, a one-credit graduate seminar, entitled "Understanding Nonpoint Source Pollution," was offered to explore the technical, legal and economic aspects of the nonpoint problem. A week-long summer workshop explored many dimensions of current resource problems. The aim of this program was to educate the teachers, both as teachers and as community members, and to increase the awareness of the 20,000 K-12 students in Washington County.

To complement these programs, funding was received from the State of Wisconsin Department of Public Instruction (DPI) under Title IVc of the federal Elementary and Secondary Education Act. These grant funds were used primarily to support a project coordinator and to pay teachers for time spent on researching and writing new teaching units.

Students who were taught these units were pre-tested and post-tested to determine if the new materials increased their awareness and understanding of resource issues and problems. Results were highly encouraging. After the units had been taught and evaluated, they were edited and assembled into two volumes entitled "Local Watershed Problem Studies: Materials for Middle and High School" and "Local Watershed Problem Studies: Elementary School Activities."

In the next phase of activity, teachers who had experience with the program, were selected to work on dissemination teams. These teams worked to involve teachers not previously involved in the program. All types of schools—public, private and parochial—participated in the program. In addition, teachers in neighboring Waukesha County were included. Efforts to expand the program beyond the boundaries of the two counties were frustrated by a lack of financial support and by the cumbersome bureaucratic constraints of the educational establishment.

In addition to working with teachers, a program—the Resource Information Program (RIP)—was designed to increase the understanding of the relationship between land use and water quality by local officials. Base maps with overlays were utilized to show how existing information (soil surveys, water quality inventories, etc.) could be used to identify areas of potential water quality problems resulting from land use activities. The technique was intended as a tool to assist local officials to assess water quality problems, to direct staff and support activities and to invest public monies for water quality improvements.

RIP presentations were made in six counties in the state. Local officials responded favorably and the program is now used by the Wisconsin DNR in its local water quality planning program.

## The Statutory Framework for Nonpoint Control

The first objective of the project's legal staff was to determine the adequacy of existing Wisconsin statutes for dealing with nonpoint source pollution problems. It was necessary to determine whether local governments had sufficient authority to control the problem or whether new state authorizing legislation was required. It was concluded that adequate authority existed, even though this authority was often flawed because many of the applicable statutes had really been written to serve other purposes, such as soil erosion control, subdivision regulation or zoning.

To eliminate some of these shortcomings, a comprehensive revision to the state's soil and water conservation law was drafted. This legislation is designed to improve the ability of government to deal with nonpoint source pollution by: (1) making nonpoint pollution abatement an explicit statutory objective, (2) expanding the authority of the county to regulate nonpoint pollution in incorporated areas (cities and villages), (3) making county-level regulation easier to enact by deleting the requirement for a referendum presently required for land use regulations under Chapter 92, (4) abolishing the soil and water conservation district (a special purpose unit of state government) and replacing it with a land conservation committee of the county board and (5) transferring the state level soil and water conservation function from the Board of Soil and Water Conservation Districts—which is attached for administrative purposes to the University of Wisconsin-Extension—to the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), where the program will be combined with the farmland preservation program. The soil and water conservation research and education responsibility remains with the University of Wisconsin-Extension.

Moving the local soil and water conservation function from the soil and water conservation district into the mainstream of county government should make the program more visible. The legislation also provides that the new county land conservation committee may assume responsibility for programs dealing with land use problems currently scattered among several

committees of the county board. Transferring the state-level responsibility to the DATCP should build a stronger program as that agency is more likely to promote an assertive program that includes regulation if appropriate. Chances for enactment of this legislation are viewed as excellent.

## The Wisconsin Fund

It is difficult to evaluate the effectiveness of the Washington County Project because the time frame of the project encompassed a period when a number of agencies were actively attempting to quantify the nonpoint problem and devise strategies to achieve its control.

In 1978 the state legislature created a new program—the Wisconsin Fund—which was designed to provide funds for the control of nonpoint source pollution, for the construction of municipal sewage treatment plants and for the replacement of failed septic systems. This unique venture was particularly timely because it afforded the opportunity to design and implement a voluntary nonpoint pollution control program. Project staff worked closely with DNR staff, who were responsible for the administration of the program, in the development of rules and guidelines for the rural nonpoint effort. A program was established which gave money to local agencies—in rural areas, the county board and the SWCD—to implement a program in designated watershed areas. The local management agencies identified priority problem areas within the watersheds, planned investments in those areas and organized and defined the roles of local public agencies in the program. Overall, it presented an excellent opportunity to put into practice many of the ideas and strategies which had evolved during the preceding years.

It is not possible at this time to evaluate the ultimate successes or failures of the Wisconsin Fund nonpoint control program. Progress to date has been excellent. Critical areas have been identified, farmer cooperation has been established and needed practices have been installed. The program is ongoing and is serving as a model for similar efforts nationwide.

The legislation which established the Wisconsin Fund required that a report be submitted to the state legislature evaluating the effectiveness of voluntary programs for controlling nonpoint source pollution and the need for regulatory measures. The voluntary vs. regulatory question remains unresolved. Basically, the issue centers on the ability of local project managers to secure the cooperation of farmers who previously have not participated in government programs. Watersheds cannot be effectively treated unless all farming operations in critical locations participate. This problem has long plagued soil and water conservation efforts.

## Recommendations

From the work of the Washington County Project the following recommendations are made for future work with nonpoint source pollution.

> *Land use-water quality monitoring work should be continued, but the focus should be on assessing the contributions of individual land use activities. Remedial measures should be tested on the same scale.*

River or stream mouth monitoring provides only information on the total pollutants delivered from a watershed. Using these methods, the relative contributions of individual land uses within that watershed are difficult to determine, and this complicates the development of effective treatment strategies.

> *A major research effort should be focused on soil and water conservation with particular emphasis on reduced tillage and the effects of erosion losses on the capability of the soil for crop production.*

Reduced tillage offers demonstrated advantages in terms of reduced soil losses and of savings of time and money. Further work is required to solve nutrient uptake and pest problems and to develop effective reduced tillage systems for a wider variety of agronomic crops. Those soil properties most essential for plant

growth are concentrated in the top few inches of an undisturbed soil, and if that critical topsoil is removed by erosion, plants are forced to grow in often entirely different materials.

*A statewide framework for nonpoint source pollution control is required which identifies technical, resource and manpower needs and which sets out and clearly defines program objectives and responsibilities.*

Implementation of this recommendation may require new enabling legislation at the state level. In addition, existing state statutes may need to be revised and updated to reflect new program thrusts.

*A specific local unit of government must be identified as the agency responsible for the administration and implementation of nonpoint source pollution control programs.*

Such an agency may already exist in many local governmental structures and all that is required to strengthen it is to define more clearly its functions and responsibilities and to increase or upgrade its staff capability. If such an agency does not exist, one must be created.

*More active field work with soil and water conservation problems at the local level is required.*

In many instances, ongoing local programs can be redirected with their missions redefined. Administrative and planning time should be reduced and more attention focused on implementation of conservation programs in priority areas. Increased financial support for remedial programs must be provided by federal, state and local governments.

*The status and role of Federal agencies at the local level should be reviewed.*

The functions of these agencies should be carefully assessed to determine if their tasks could better be handled by a local unit of government. If the diverse functions now housed in several agencies at the local level were combined, would greater efficiency be achieved? Could administrative costs be reduced, and more money be utilized for program implementation? Could the confusion which exists in the public mind about who does what be reduced?

*The impacts of and technical standards for pollution control practices must be constantly evaluated to insure maximum pollutant reduction for each public dollar invested.*

With limited public dollars available for implementing nonpoint source control programs, it is critical that maximum pollutant reduction be achieved for each dollar invested.

*Regulatory programs for sediment control should be adopted wherever they are needed and feasible.*

Regulatory programs for the control of construction site erosion are equitable and workable and should be adopted by local units of government wherever the problem exists. Nonpoint source programs on agricultural lands should be reviewed periodically to determine if the voluntary approach is working. If agricultural regulatory programs are required, they should be based on performance standards per farm unit.

*A major educational effort is needed in rural areas to increase farmers' understanding of soil erosion and nonpoint problems and of new technologies and management techniques available to reduce those problems.*

Much of the nonpoint problem in rural areas can be solved fairly simply—and inexpensively—through improved management of cropland and barnyard/feedlot areas. Moreover, those practices installed to reduce soil erosion and nonpoint source pollution will not be effective unless they are properly managed. Sound management will be the key to the ultimate success or failure of programs in rural areas.

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